

Highlighted Speaker - Implications of the Continued Increase in Atmospheric Methane Burden

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Measurements of methane (CH_4) from weekly air samples collected in GMD's cooperative global air sampling network provide an important constraint on the global CH_4 budget. In 2016, atmospheric CH_4 continued to increase, and the average rate of increase during 2014 to 2016 was ~ 11 ppb yr^{-1} . In contrast, the growth rate of atmospheric CH_4 was near-zero from 1999 to 2006. While atmospheric CH_4 's current rate of increase is still lower than it was in the early-1980s, emissions are likely greater now than any time since NOAA measurements began in 1983. Figure 1 shows emissions estimated from a 1-box mass balance using the observed global annual mean burden and annual increase combined with an estimate of CH_4 's lifetime. With the assumption of no trend in lifetime, we found no trend in emissions from 1984-2006 (blue circles and dashed line). This result contrasts with Emission Database for Global Atmospheric Research (EDGAR) anthropogenic emissions plus a fixed amount for natural emissions (red triangles), which shows a significant trend driven mostly by increased production and use of fossil fuels. In 2007, our estimate of emissions from the observations increased above the 1984-2006 trend, then increased further starting in 2014. We've identified changing tropical emissions related to precipitation as a likely major contributor to the renewed increase in atmospheric CH_4 , but many additional processes must also be involved. The details of the causes, although still not known, are important for CH_4 's future impact on climate.

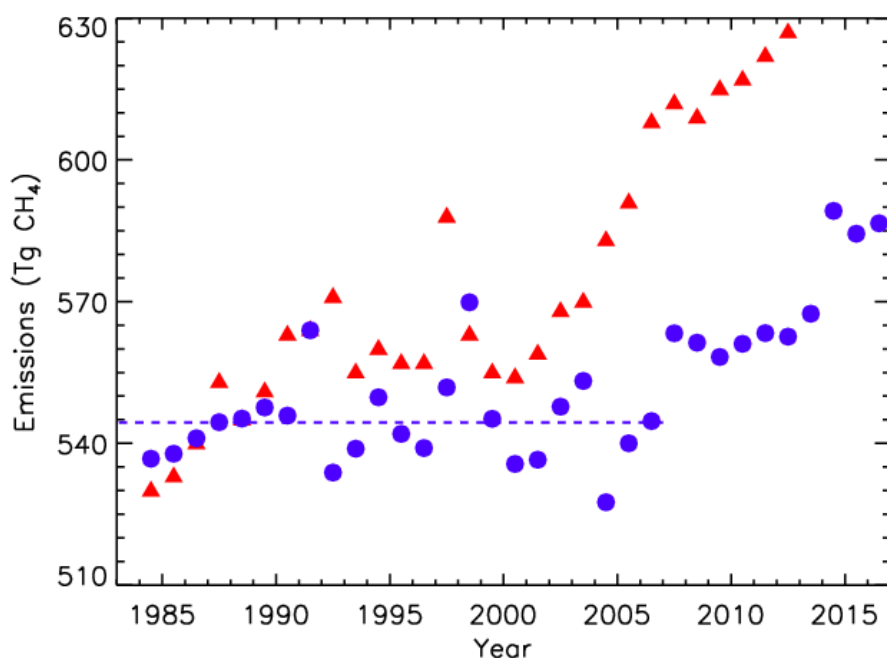


Figure 1. Total global CH_4 emissions determined from observations (blue) and from EDGAR inventory plus fixed natural emissions (red). Observation-based estimates are based on mass balance using CH_4 global annual means and annual increase and a constant lifetime of 9.1 yr to calculate loss. The dashed line is a straight line fitted to the annual emissions from 1984-2006 (slope = 0 ± 0.6 Tg CH_4 yr^{-1} ; 95% CI). We add 245 Tg CH_4 yr^{-1} natural emissions to EDGAR's anthropogenic emissions to get total global emissions.